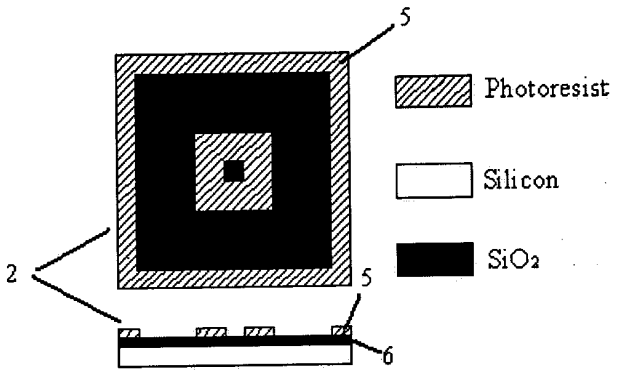


FIG.1(A) (1)

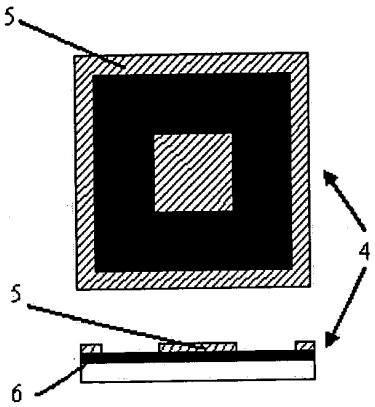


FIG.1(A)(2)

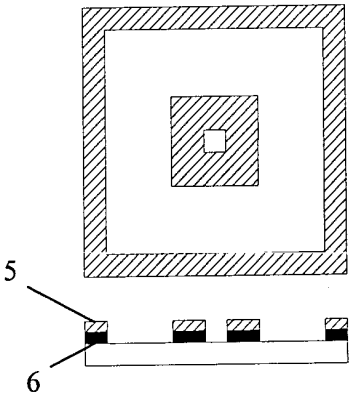


FIG. 1(B)(1)

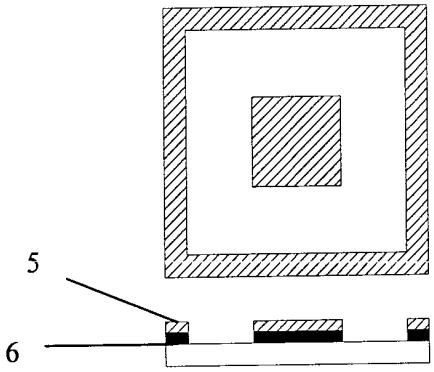


FIG. 1(B)(2)

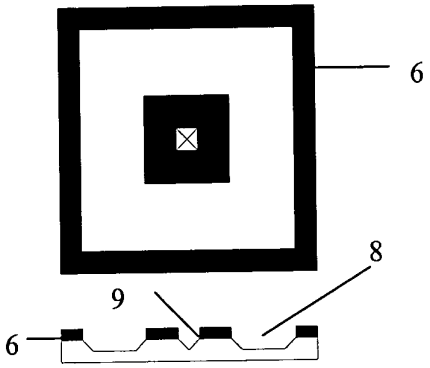


FIG. 1(C)(1)

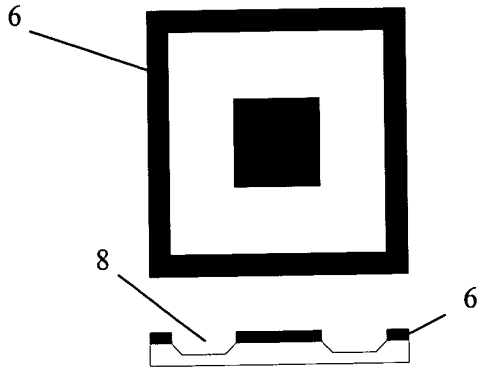


FIG. 1(C)(2)

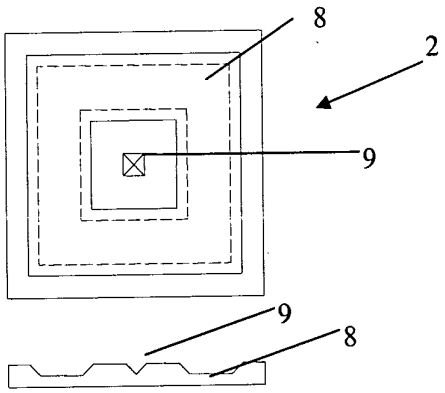


FIG. 1(D)(1)

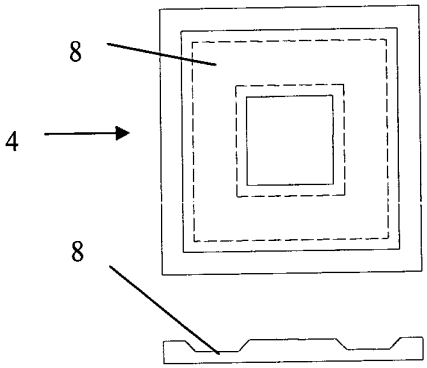


FIG. 1(D)(2)

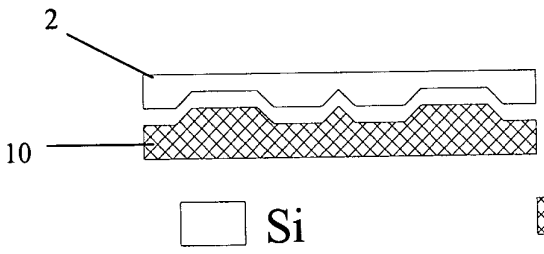


FIG. 1(E)(1)

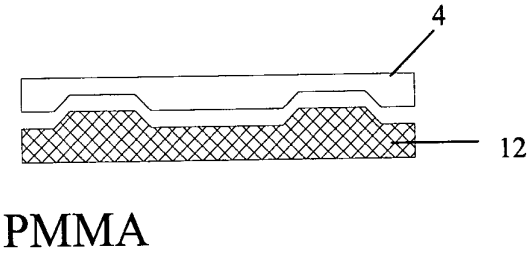


FIG. 1(E)(2)

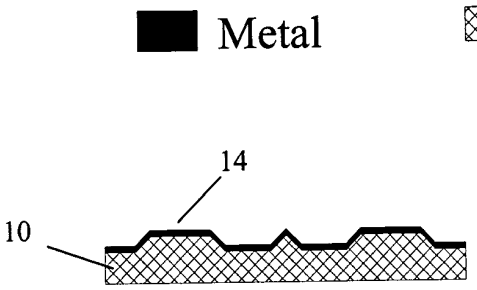


FIG. 1(F)(1)

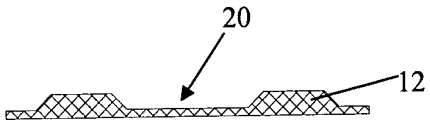


FIG. 1(F)(2)

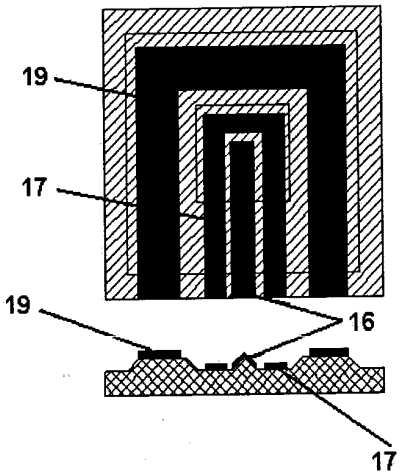


FIG. 1(G)(1)

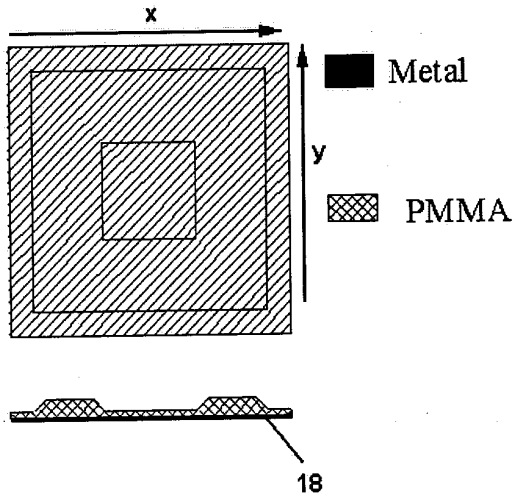


FIG. 1(G)(2)

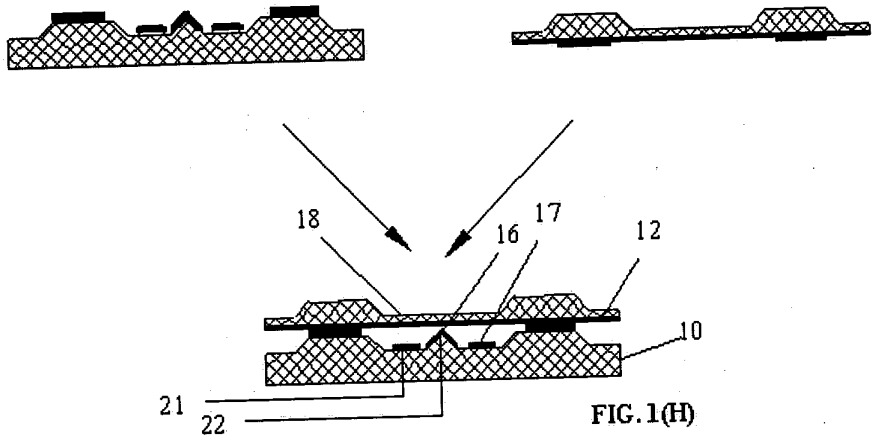


FIG. 1(H)

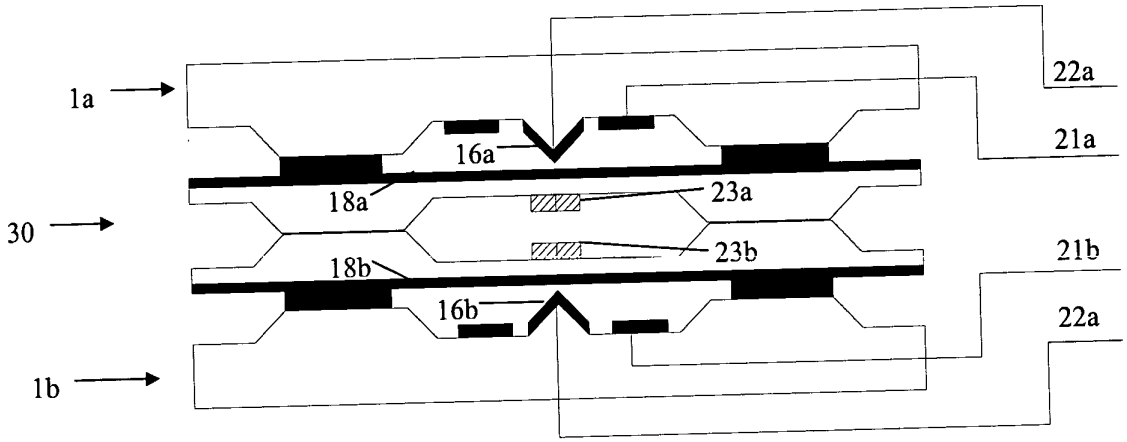


FIG. 2(A)

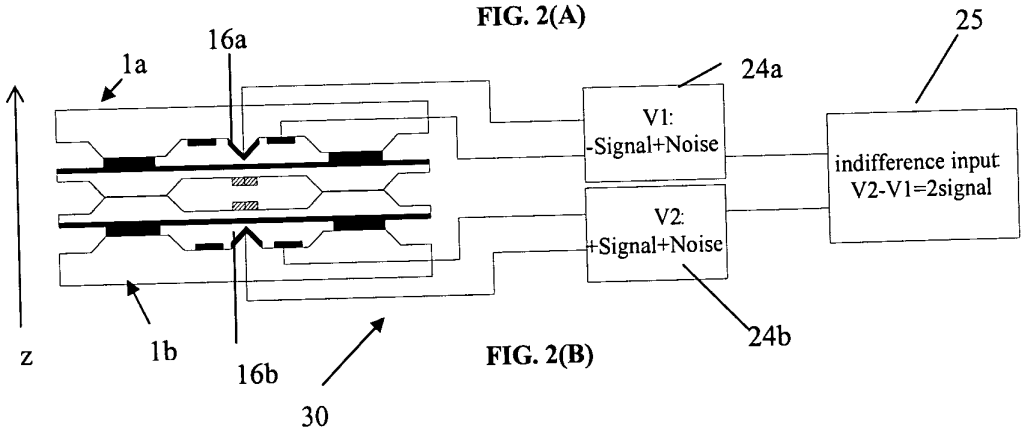


FIG. 2(B)

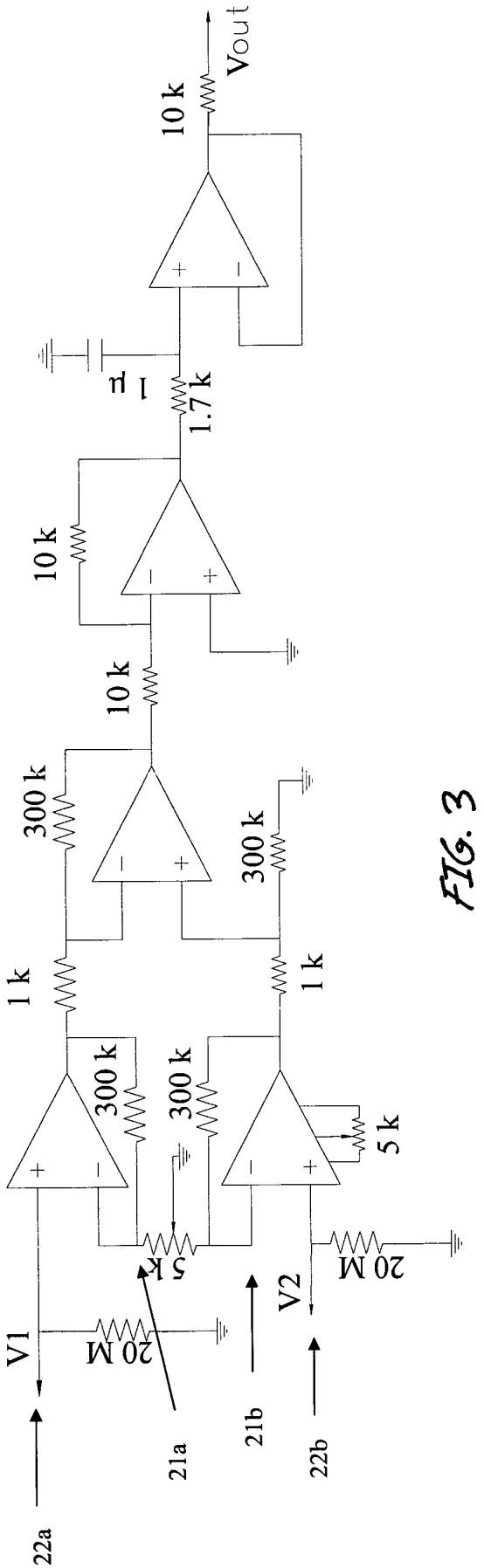

Vout
10 k
1.7 k
1 µ
10 k
10 k
300 k
300 k
1 k
1 k
300 k
300 k
5 k
5 K
20 M
20 M
V1
V2
22a
21a
21b
22b

FIG. 3

Process Flow Chart Illustration

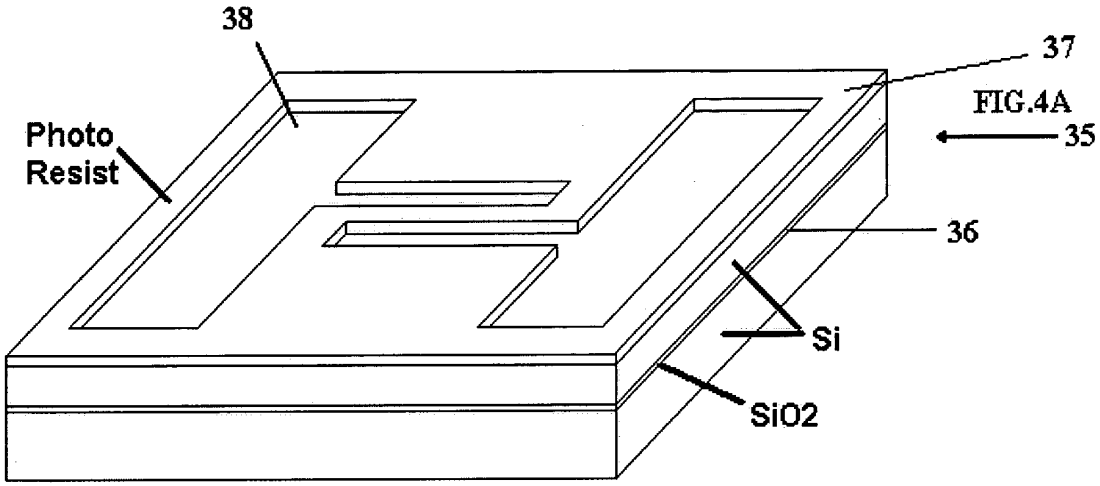


FIG.4A

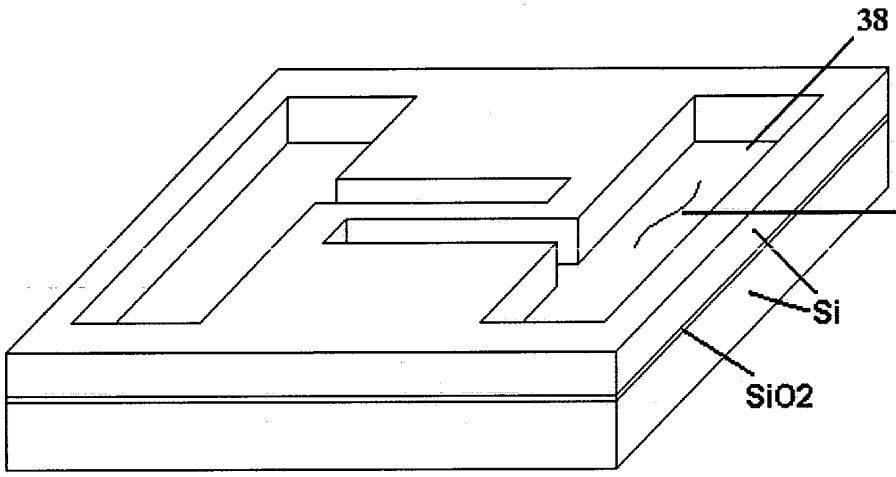


FIG.4B

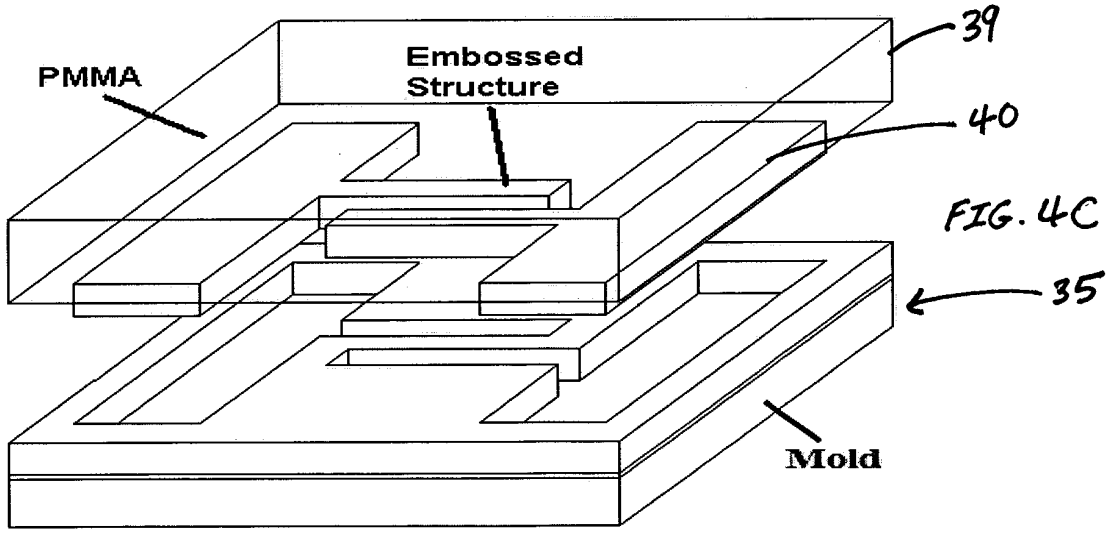


FIG. 4C

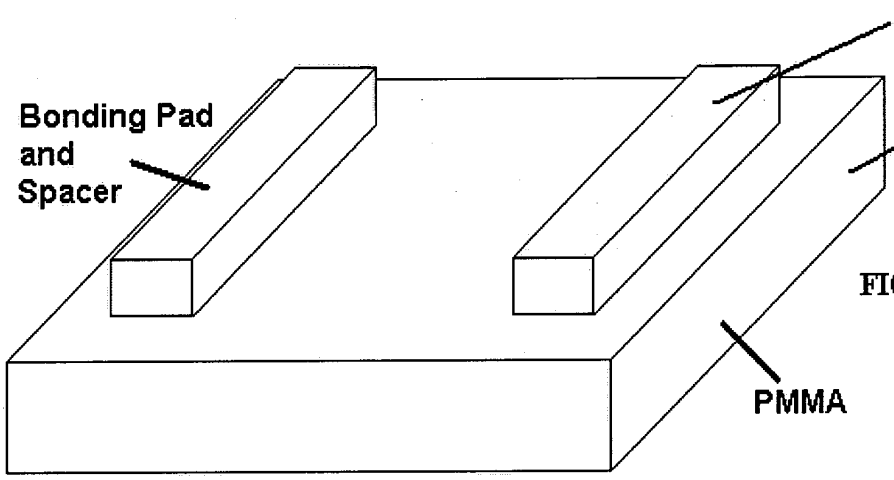


FIG.4D

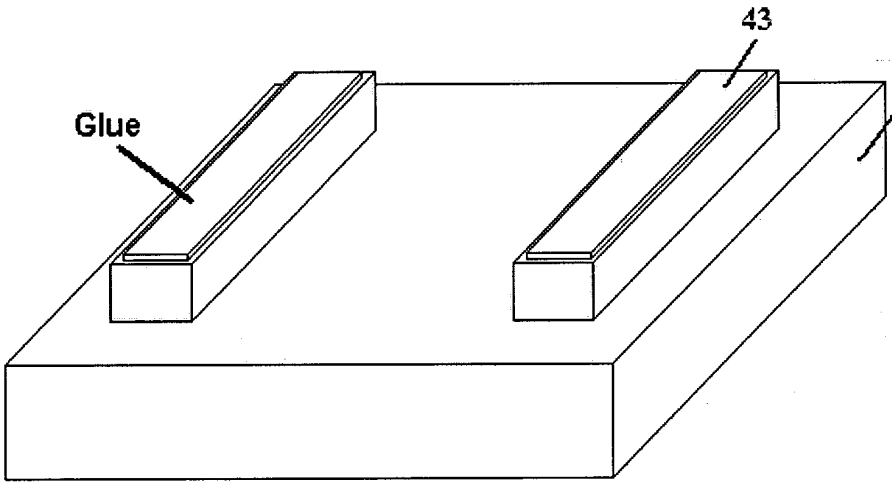


FIG.4E

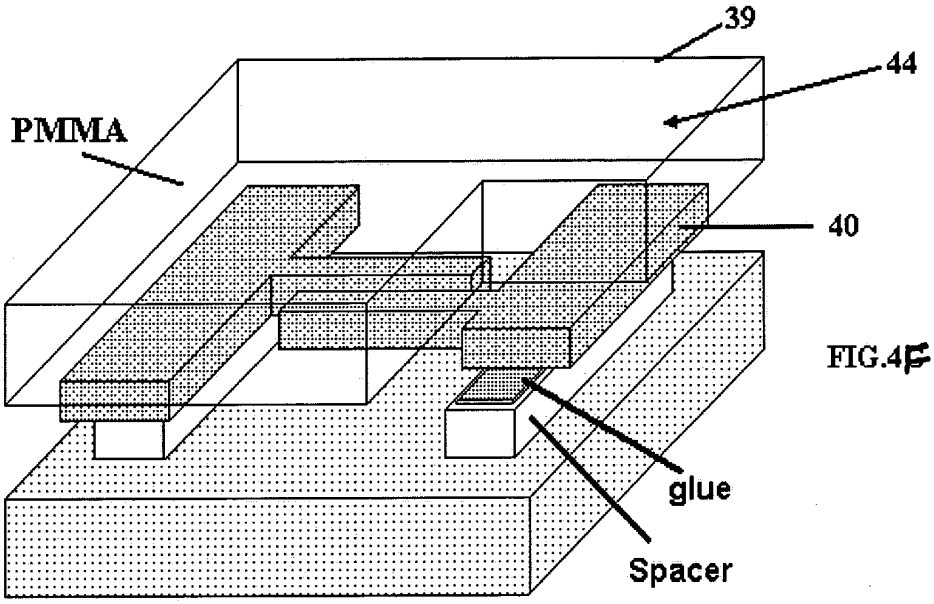


FIG.4E

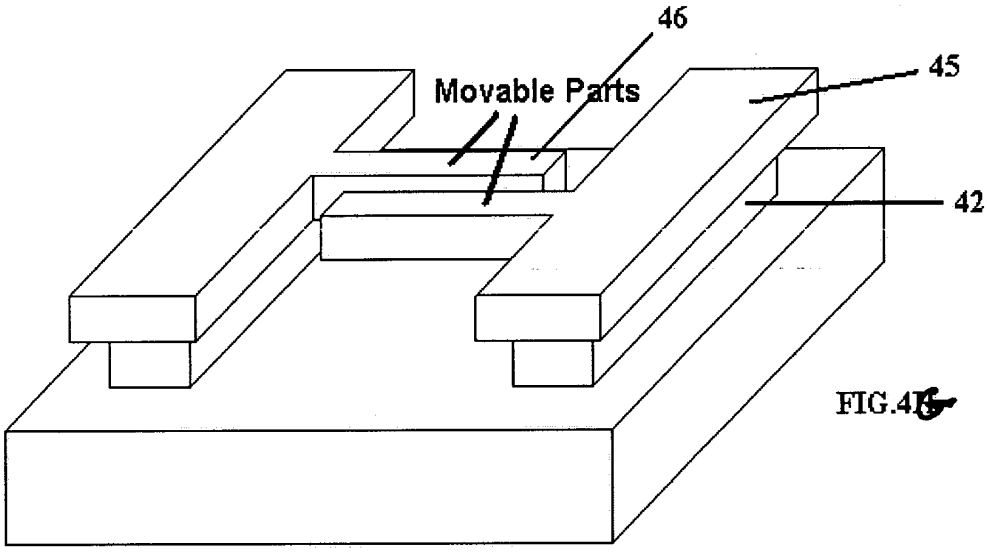


FIG.4F

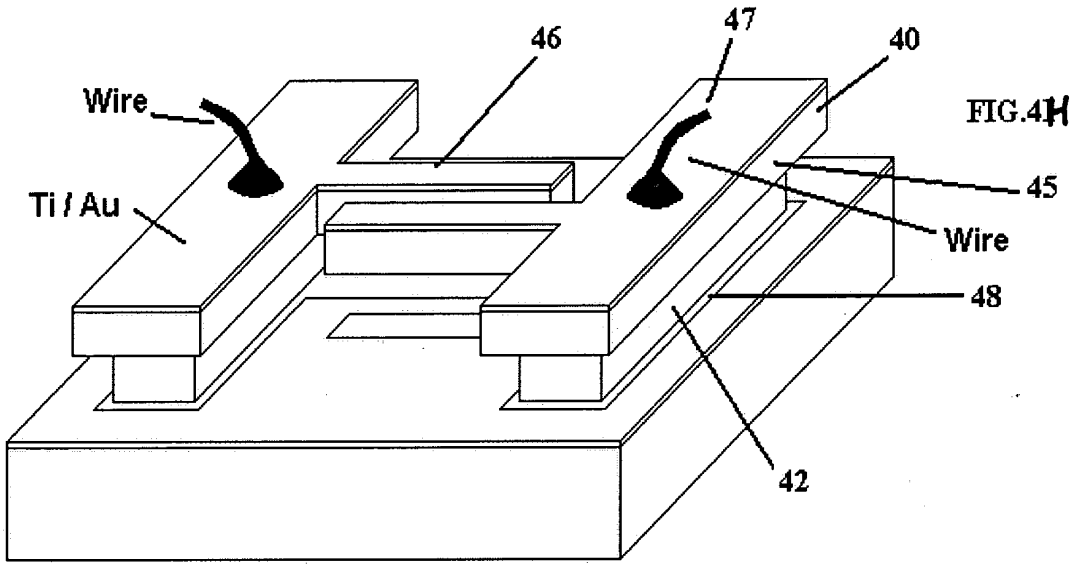

46
47
40
Wire
Ti / Au
45
Wire
48
42

FIG.4H

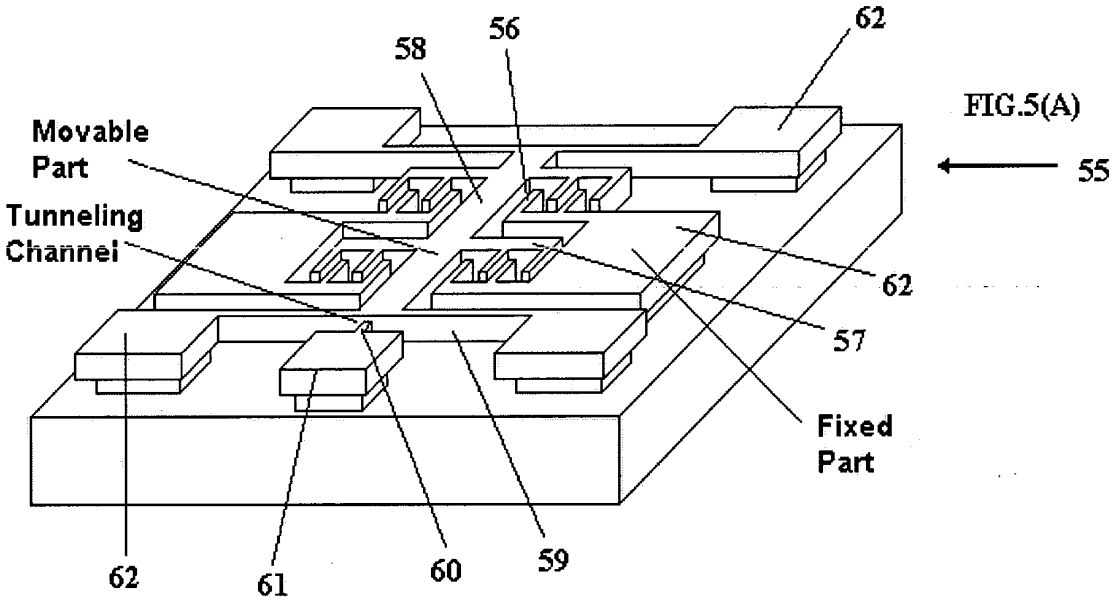

58
56
62
Movable
Part
Tunneling
Channel
55
62
57
Fixed
Part
62
61
60
59

FIG.5(A)

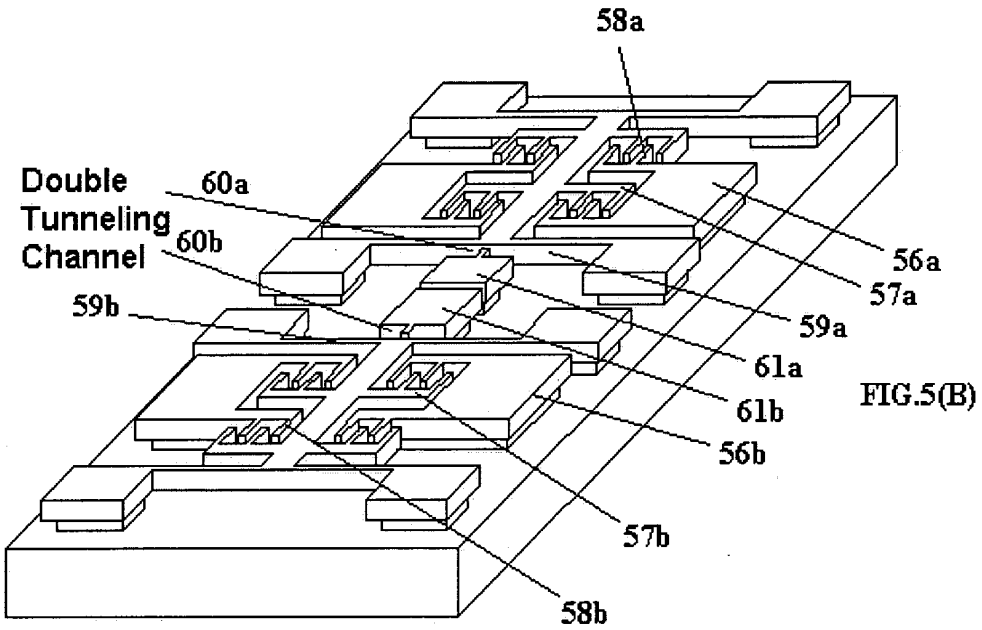

58a
Double
Tunneling
Channel
60a
60b
59b
56a
57a
59a
61a
61b
56b
57b
58b

FIG.5(B)

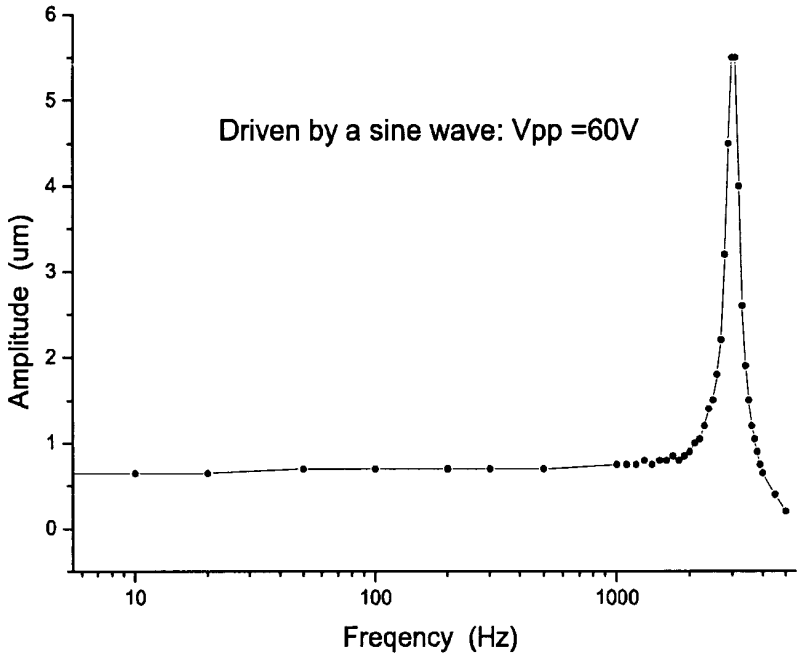
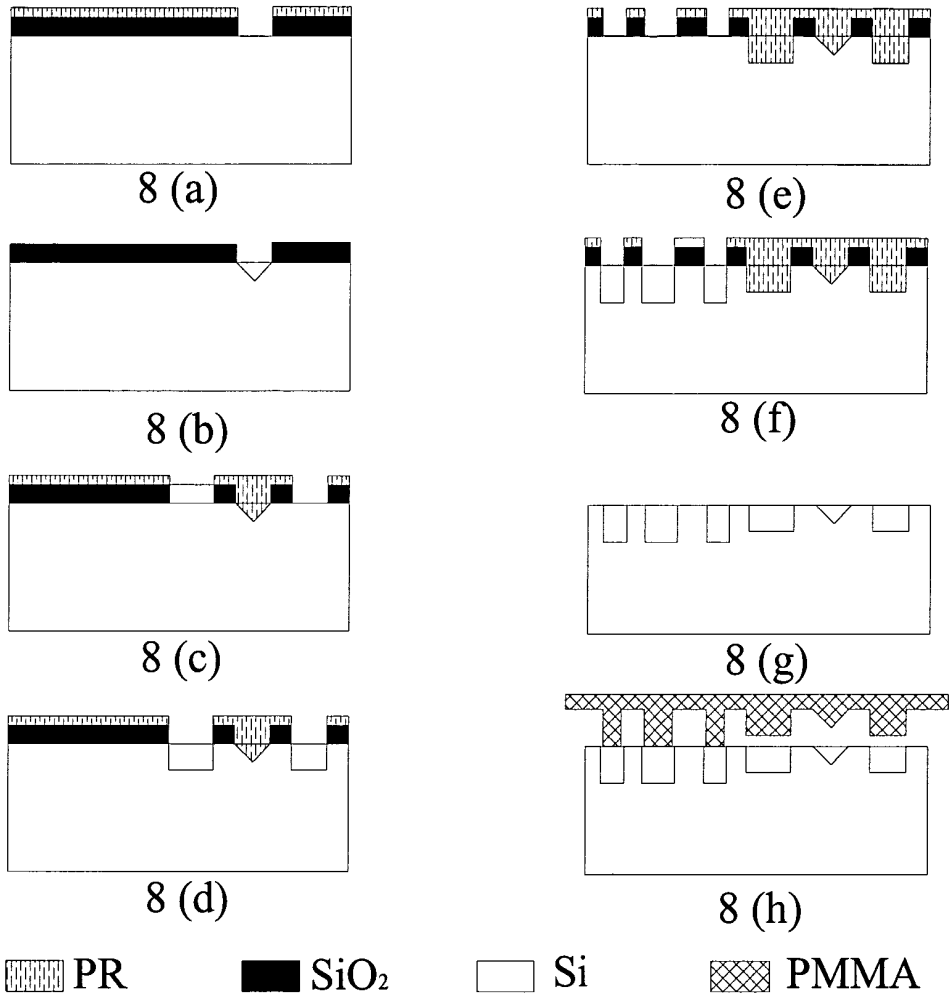

Driven by a sine wave: Vpp =60V
Amplitude (um)
Freqency (Hz)
0
1
2
3
4
5
6
10
100
1000

FIG.6



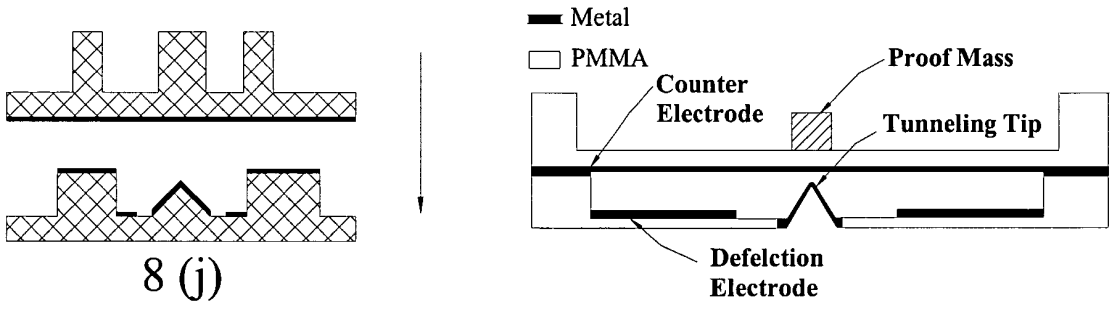


FIG. 8 (k)
Cross section of a membrane type PMMA-based tunneling sensor

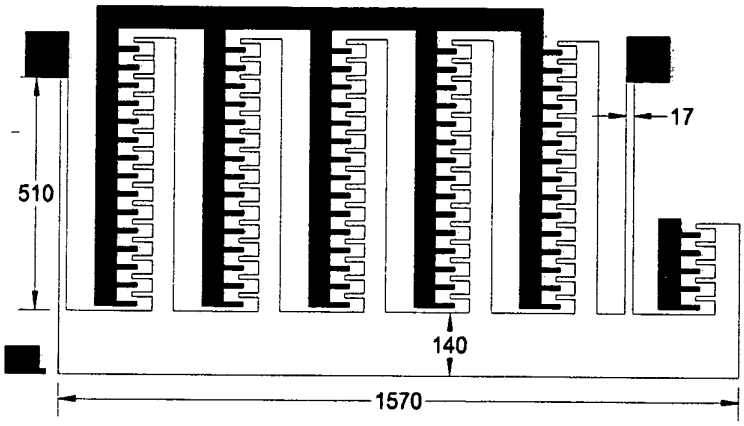


FIG.7

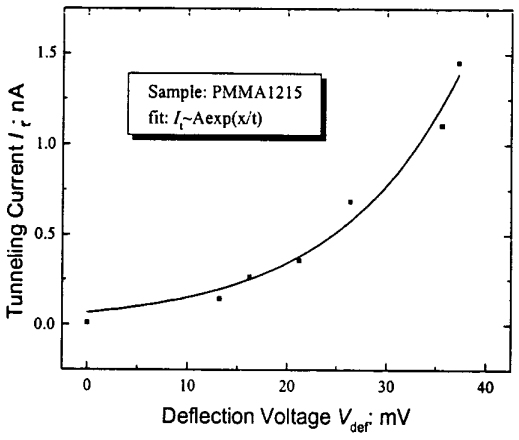


FIG. 9 The exponential relationship between tunneling currents and applied deflection voltages